

ABSTRACT OF THE DISCLOSURE

A method for vitrification of a tissue or organ includes immersing the tissue or organ in increasing concentrations of cryoprotectant solution at a temperature greater than  $-15^{\circ}\text{C}$  to a cryoprotectant concentration sufficient for vitrification; cooling the tissue or organ at an average rate of from  $2.5\text{-}100^{\circ}\text{C}$  per minute to a temperature between  $-80^{\circ}\text{C}$  and the glass transition temperature; and further cooling the tissue or organ at an average rate less than  $30^{\circ}\text{C}$  per minute to a temperature below the glass transition temperature to vitrify the tissue or organ. After the vitrified tissue or organ has been stored, the tissue or organ may be removed from vitrification by warming the tissue or organ at an average rate of from  $20\text{-}40^{\circ}\text{C}$  per minute to a temperature between  $-80^{\circ}\text{C}$  and the glass transition temperature; further warming the tissue or organ at a rate greater than  $80^{\circ}\text{C}$  per minute to a temperature above  $-75^{\circ}\text{C}$ ; and reducing the concentration of the cryoprotectant. Tissues or organs treated in this manner exhibit near normal functions, for example, blood vessels exhibit near normal smooth muscle contractility and normal graft functions.